REMARKS

The 6 June 2001 official action addressed claims 1-31. Claims 1-7, 9, 15, 16, 22, 23, and 29-31 have been amended. Claims 1-31 are in the present application.

Claims 1-3, 5-7, and 15, and 22 are rejected under 35 U.S.C. 102(b) as being anticipated by Wu et al. (U.S. Patent 5,774,551) (hereinafter Wu).

The Examiner's rejections are respectfully traversed.

Regarding claim 1, claim 1, as amended, recites a packet processor comprising:

"a control unit having a data input bus;

at least one encryption processing unit;

a first authentication processing unit;

a second authentication processing unit;

a local data bus, independent of the data input bus to the control unit, coupling the control unit to each of the encryption and authentication processing units; and

a second data bus from the encryption processing unit to each authentication processing unit, including a data bus from the first authentication processing unit to the second authentication processing unit."

Wu neither discloses or suggests the claimed invention, including the above-cited features.

Wu teaches software implemented authorization services along with other services that reside in a memory and are executed by a main processor. (See Wu's FIG. 1; col. 5, lines 7-22.) Wu further teaches a software implementation of a primary authentication token for a primary authentication service, such as a password, private key, or other unique data to encrypt the user's other authentication tokens for other authentication services. (See col. 3, 58-62.)

In contrast, Applicants teach a packet processor comprising buses between a plurality of processing units that perform data processing independently of a main

processor. A local data bus, independent of the data input bus to the control unit, couples the control unit to each of the encryption and authentication processing units. A second data bus connects the encryption processing unit to each authentication processing unit. The second data bus includes a data bus from the first authentication processing unit to the second authentication processing unit.

Wu does not teach or suggest a packet processor comprising buses between a plurality of processing units that process data independently of the main procesor. Furthermore, Wu does not teach or suggest a local data bus, independent of the data input bus to the control unit, coupling the control unit to each of the encryption and authentication processing units. Nor does Wu teach or suggest a second data bus from the encryption processing unit to each authentication processing unit, including a data bus from the first authentication processing unit to the second authentication processing unit.

Wu's FIG. 1 and the text cited by the Examiner at most suggests that the software implemented authentication services communicate between themselves and between other software implemented services through software instructions executed by the main processor.

The Examiner will note from the above discussion that there are several elements of Applicant's claim 1, as amended, that are not present nor even suggested in Wu. Thus, for the reasons stated above, the subject matter of Applicants' claim 1 is not anticipated by Wu under 35 U.S.C. 102(b) and is therefore believed to be allowable.

Regarding claims 2 and 3, claims 2 and 3 depend directly from claim 1, and for at least this reason, are believed to be allowable.

Furthermore, claim 2, as amended, recites the packet processor of claim 1, wherein

"said data input bus of the control unit is coupled to a processor bus and each of said encryption and authentication processing units comprises a data input bus coupled to the processor bus."

Wu neither discloses nor suggests the claimed invention, including the above-quoted features.

As stated above, Wu teaches software implemented authorization services along with other services that reside in a memory and are executed by a main processor. Wu does not teach or suggest that a data input bus of the control unit is coupled to a processor bus and each of said encryption and authentication processing units comprises a data input bus coupled to the processor bus. At most, Wu teaches a processor bus connected to a memory wherein resides various software implemented services, including authentication services, that are executed by the processor. (See Wu's FIG. 1; col. 5, lines 7-22.)

Therefore, for this additional reason, claim 2, as amended, is believed to be allowable.

Claim 3, as amended, recites the packet processor of claim 1, wherein

"said data input bus of the control unit is coupled to a processor bus and each of said encryption and authentication processing units comprises a data input bus to the processor bus and means for reading and writing data on the processor bus."

Wu neither discloses nor suggests the claimed invention, including the above-quoted features.

As stated above, at most, Wu teaches a processor bus connected to a memory wherein resides various software implemented services, including authentication services, that are executed by the processor. Wu does not teach or suggest that a data input bus of the control unit is coupled to a processor bus and each of said encryption and authentication processing units comprises a data input bus to the processor bus and means for reading and writing data on the processor bus. Wu's FIG. 3 merely shows software implemented handshaking between one software module (123) and another (109). FIG. 3 does not teach or suggest that each of said encryption and authentication processing units comprises a data input bus to the processor bus and means for reading and writing data on the processor bus.

Therefore, for these additional reasons, claim 3, as amended, is believed to be allowable.

Regarding claim 5, claim 5, as amended, recites a method of processing data packets comprising

"coupling a control unit to a first data bus;

receiving first and second data packets in the control unit from the first data bus;

providing a plurality of processing units in data communication with the control unit over a second data bus, independent of the first data bus, said processing units including at least one encryption processing unit and at least one authentication processing unit;

providing data of the first data packet from the control unit to one of the processing units, over the second data bus;

processing said data from the first data packet with said one of the processing units to provide output data for the first data packet from said one of the processing units;

communicating said output data for the first data packet from said one of the processing units to another of the processing units for further processing; and

providing data from the second data packet to said one of the processing units, while said other processing unit further processes the output data for the first data packet."

Wu neither discloses nor suggests the claimed invention, including the above-quoted steps.

As stated above, Wu teaches software implemented authorization services along with other services that reside in a memory and are executed by a main processor. Wu does not teach or suggest providing a plurality of processing units in data communication with the control unit over a second data bus, independent of the first data bus, said processing units including at least one encryption processing unit and at least one authentication processing unit which process data independently of the main processor. At most, Wu teaches a processor bus connected to a memory wherein resides various software implemented services, including authentication services, that are executed by the processor.

Furthermore, for the same reasons, Wu does not teach or suggest providing data of the first data packet from the control unit to one of the processing units, over the second data

bus or processing said data from the first data packet with said one of the processing units to provide output data for the first data packet from said one of the processing units.

In addition, for the same reasons, Wu does not teach or suggest providing data from the second data packet to said one of the processing units, while said other processing unit further processes the output data for the first data packet.

The Examiner will note from the above discussion that there are several steps of Applicant's claim 5, as amended, that are not present nor even suggested in Wu. Thus, for the reasons stated above, the subject matter of Applicants' amended claim 5 is not anticipated by Wu under 35 U.S.C. 102(b) and is therefore believed to be allowable.

Because they depend directly from claim 5, claims 6 and 7, as amended, and claim 8 are, for at least that reason, also believed to be allowable.

Furthermore, claim 6, as amended, recites the method of claim 5 wherein

"said one of the processing units comprises an encryption processing unit and said other of said processing units comprises an authentication processing unit."

Wu neither discloses or suggests the claimed invention, including the above-quoted features.

As stated above, Wu teaches software implemented authorization services along with other services that reside in a memory and are executed by a main processor. Wu does not teach or suggest an encryption processing unit and an authentication processing unit which process data independently of the main processor.

Therefore, for this additional reason, claim 6, as amended, is believed to be allowable.

Regarding claim 7, claim 7, as amended, recites the method of claim 5 wherein

"said at least one authentication processing unit comprises a first and second authentication processing units."

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Wu neither discloses or suggests the claimed invention, including the above-quoted features.

As stated above, Wu teaches software implemented authorization services along with other services that reside in a memory and are executed by a main processor. Wu does not teach or suggest first and second authentication processing units which process data independently of the main processor.

Therefore, for this additional reason, claim 7, as amended, is believed to be allowable.

Regarding claim 15, claim 15, as amended, recites a method of processing data in a computer, the method comprising the steps of

"encrypting a first data packet with an encryption processing module;

authenticating the encrypted first data packet with a first authentication processing module;

encrypting a second data packet with the encryption processing module while authenticating the first data packet with the first authentication processing module connected to the encryption processing module by a data bus; and

authenticating the second data packet with the first authentication processing module."

Wu neither discloses or suggests the claimed invention, including the above-quoted steps.

As stated above, Wu teaches software implemented authorization services along with other services that reside in a memory and are executed by a main processor. Wu does not teach or suggest encryption or authentication modules which process data independently of the main processor. Nor does Wu teach or suggest encrypting a second data packet with the encryption processing module while authenticating the first data packet with the first authentication processing module connected to the encryption processing module by a data bus. At most, Wu teaches a processor bus connected to a main memory containing software implemented authentication modules wherein data is processed by the main processor.

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The Examiner will note from the above discussion that there are several steps of Applicant's claim 15, as amended, that are not present nor even suggested in Wu. Thus, for the reasons stated above, the subject matter of Applicants' amended claim 15 is not anticipated by Wu under 35 U.S.C. 102(b) and is therefore believed to be allowable.

Regarding claim 22, claim 22, as amended, recites an apparatus for processing data, comprising

"a computer having a data storage device connected thereto, wherein the data storage device stores a data;

one or more computer programs, performed by the computer, for encrypting a first data packet with an encryption processing module, authenticating the encrypted first data packet with a first authentication processing module connected to the encryption processing module by a data bus, encrypting a second data packet with the encryption processing module while authenticating the first data packet with the first authentication processing module, and authenticating the second data packet with the first authentication processing module."

Wu neither discloses or suggests the claimed invention, including the above-quoted features.

As stated above, Wu teaches software implemented authorization services along with other services that reside in a memory and are executed by a main processor. Wu does not teach or suggest the invention recited in claim 22, including authenticating the encrypted first data packet with a first authentication processing module connected to the encryption processing module by a data bus, encrypting a second data packet with the encryption processing module while authenticating the first data packet with the first authentication processing module, and authenticating the second data packet with the first authentication processing module.

The Examiner will note from the above discussion that there are several elements of Applicant's claim 22, as amended, that are not present nor even suggested in Wu. Thus, for the reasons stated above, the subject matter of Applicants' amended claim 22 is not anticipated by Wu under 35 U.S.C. 102(b) and is therefore believed to be allowable.

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Claims 4, 8-21, and 23-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wu.

The Examiner's rejections are respectfully traversed.

Regarding claim 4, claim 4 depends directly from claim 1 and is, for at least that reason, believed to be allowable.

Furthermore, claim 4, as amended, recites a packet processor as recited in claim 1, wherein

"said second data bus comprises a daisy-chain connection between the encryption and authentication processing units."

Wu neither discloses nor suggests the claimed invention, including the above-quoted features.

As stated above, Wu teaches software implemented authorization services along with other services that reside in a memory and are executed by a main processor. Wu does not teach or suggest encryption and authentication processing units that process data independently of the main processor.

In addition, as the Examiner recognizes, Wu does not teach or suggest a second data bus which comprises a daisy-chain connection between the encryption and authentication processing units. However, the Examiner takes official notice that such a chain is well known in the art.

While a daisy chain may be well known in the art, the Examiner cites no references that teach or suggest such a daisy chain connecting encryption and authentication processing units, as recited in Applicants' claim 4. The use of such a daisy chain to connect the encryption and authentication processing units provides an advantage in that the use of the local bus and daisy chain bus allows the control unit and processing units to pass information therebetween, without using the processor bus. Thus, because the encryption and authentication units do not use the processor bus for reading input data and because intermediate data is not passed between those units over the processor bus, traffic on the processor bus can be reduced or minimized. (See Applicants' FIG. 2; page 12, lines 16-21.)

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Therefore, for these additional reasons, claim 4, as amended, is believed to be allowable.

Regarding claim 8, claim 8 depends directly from claim 5 and is, for at least that reason, believed to be allowable.

Furthermore Regarding claim 8, claim 8 recites a method as recited in claim 5, wherein

"said step of communicating the output data from one of the processing units to another of the processing units comprises communicating said output data over a daisy-chain connection between said processing units."

Wu neither discloses or suggests the claimed invention, including the above-quoted steps.

As stated above, Wu teaches software implemented authorization services along with other services that reside in a memory and are executed by a main processor. Wu does not teach or suggest encryption and authentication processing units that process data independently of the main processor.

In addition, as the Examiner recognizes, Wu does not teach or suggest communicating the output data over a daisy-chain connection between said processing units. However, the Examiner takes official notice that such a chain is well known in the art.

While a daisy chain may be well known in the art, the Examiner cites no references that teach or suggest communicating the output data over a daisy-chain connection between processing units such as those recited in Applicants' claim 8. Thus, for this reason and for the additional reasons stated above in relation to claim 4, claim 8 is believed to be allowable.

Regarding claim 9, claim 9, as amended, recites a method of processing data in a computer, the method comprising the steps of:

"performing encryption on a first data packet within an encryption processing unit; and

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after completion of the encryption of the first data packet,

performing authentication of the first data packet within at least one authentication processing unit connected to the encryption processing unit by a data bus, and

performing encryption of a second data packet within the encryption processing unit prior to completion of authentication of the first data packet."

Wu neither discloses or suggests the claimed invention, including the above-quoted steps.

As stated above, Wu teaches software implemented authorization services along with other services that reside in a memory and are executed by a main processor. Wu does not teach or suggest encryption and authentication processing units that process data independently of the main processor. Furthermore, Wu does not teach or suggest an authentication processing unit connected to an encryption processing unit by a data bus. At most, Wu teaches a processor bus connected to a memory wherein resides various software implemented services, including authentication services, that are executed by the processor.

Furthermore, as the Examiner recognizes, Wu does not teach or suggest performing encryption on a first data packet and after completion of the encryption of the first data packet, performing authentication of the first data and performing encryption of a second data packet prior to completion of authentication of the first data packet. However, the Examiner takes official notice that encrypting a second packet before authentication is well known in the art.

Even if encrypting a second packet before authentication is well known in the art, as the Examiner alleges, the Examiner cites no references which teach or suggest encrypting a second packet before authentication within an encryption processing unit, as recited in Applicants' amended claim 9. Furthermore, the Examiner cites no references which teach or suggest encrypting a second packet before authentication and after completion of the encryption of the first data packet, performing authentication of the first data packet within at least one authentication processing unit connected to the encryption processing unit by a data bus.

In addition, the Examiner cites no references which teach or suggest encrypting a second packet before authentication and performing encryption of a second data packet

within the encryption processing unit prior to completion of authentication of the first data packet.

Therefore, Applicant's claim 9, as amended, is not made obvious by Wu. Thus, the Patent and Trademark Office has not made out a prima face case of obviousness under the provisions of 35 U.S.C. 103(a), and claim 9 is believed to be allowable.

Regarding claims 10-14, claims 10-14 depend directly or indirectly from claim 9 and are, for at least this reason, believed to be allowable.

Regarding claim 16, claim 16, as amended, recites an apparatus for processing data, comprising

"a computer having a data storage device connected thereto, wherein the data storage device stores a data;

one or more computer programs, performed by the computer, for performing encryption on a first data packet within an encryption processing unit, and, after completion of the encryption of the first data packet, performing authentication of the first data packet in at least one authentication processing unit connected to the encryption processing unit by a data bus, and

performing encryption of a second data packet within the encryption processing unit prior to completion of authentication of the first data packet."

Wu neither discloses or suggests the claimed invention, including the above-quoted features.

For the same reasons as those stated above in relation to amended claim 9, claim 16, as amended, is believed to be allowable.

Regarding claims 17-21, claims 17-21 depend directly or indirectly from claim 16 and are, for at least this reason, believed to be allowable.

Regarding claim 23, claim 23, as amended, recites an article of manufacture comprising a computer program carrier readable by a computer and embodying one or more

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instructions executable by the computer to perform method steps for processing data, the method comprising the steps of

"performing encryption on a first data packet with an encryption processing unit; and

after completion of the encryption of the first data packet,

performing authentication of the first data packet in at least one authentication processing unit connected to the encryption processing unit by a data bus, and

performing encryption of a second data packet within the encryption processing unit prior to completion of authentication of the first data packet."

Wu neither discloses or suggests the claimed invention, including the above-quoted steps.

For the same reasons as those stated above in relation to amended claim 9, claim 23, as amended, is believed to be allowable.

Regarding claims 24-28, claims 24-28 depend directly or indirectly from claim 23 and are, for at least this reason, believed to be allowable.

Regarding claim 29, claim 29, as amended, recites an article of manufacture comprising a computer program carrier readable by a computer and embodying one or more instructions executable by the computer to perform method steps for processing data, the method comprising the steps of

"encrypting a first data packet with an encryption processing module;

authenticating the encrypted first data packet with a first authentication processing module connected to the encryption processing unit by a data bus;

encrypting a second data packet with the encryption processing module while authenticating the first data packet with the first authentication processing module; and

authenticating the second data packet with the first authentication processing module."

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Wu neither discloses or suggests the claimed invention, including the above-quoted steps.

For the same reasons as those stated above in relation to amended claim 9, claim 29, as amended, is believed to be allowable.

Regarding claim 30, claim 30, as amended, recites a method of processing data packets comprising

"coupling a control unit to a first data bus;

receiving a first data packet in the control unit from the first data bus;

providing a plurality of processing units in data communication with the control unit over a second data bus, independent of the first data bus, said processing units including at least one encryption processing unit and at least one authentication processing unit;

providing data of the first data packet from the control unit to multiple processing units, over the second data bus;

processing said data from the first data packet with said multiple processing units in parallel."

Wu neither discloses or suggests the claimed invention, including the above-quoted steps.

For the same reasons as those stated above in relation to amended claims 1 and 5, claim 30, as amended, is believed to be allowable.

Regarding claim 31, claim 31 depends directly from amended claim 30 and is, for at least this reason, believed to be allowable.

Furthermore, claim 31, as amended, recites a method as recited in claim 30, wherein

"said plurality of processing units comprises at least one encryption processing unit and a plurality of authentication processing units."

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Wu neither discloses or suggests the claimed invention, including the above-quoted features.
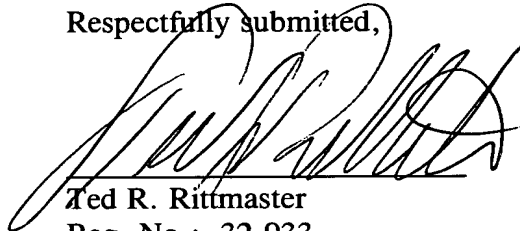
For the reasons stated above in relation to amended claim 1, claim 31 is believed to be allowable.

The application is now considered to be in condition for allowance and an early indication of same is earnestly solicited.

Respectfully submitted,

November 1, 2001
Date

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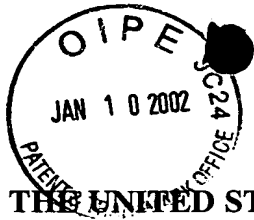
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MARK-UP VERSION OF AMENDMENT IN RESPONSE
TO OFFICE ACTION OF JUNE 6, 2001

Commissioner for Patents
Washington, D.C. 20231

Commissioner:

In reply to the Office Action mailed June 6, 2001, please amend the above-identified application as follows:

IN THE CLAIMS

Claims 1-7, 9, 15, 16, 22, 23, and 29-31 are amended as follows:

1.   (Amended) A packet processor comprising:

a control unit having a data input ~~path~~ bus;

at least one encryption processing unit;

a first authentication processing unit;

a second authentication processing unit;

a local data ~~path~~ bus, independent of the data input ~~path~~ bus to the control unit, coupling the control unit to each of the encryption and authentication processing units; and

a second data ~~path~~ bus from the encryption processing unit to each authentication processing unit, including a data ~~path~~ bus from the first authentication processing unit to the second authentication processing unit.

2. (Amended) A packet processor as recited in claim 1, wherein said data input ~~path~~ bus of the control unit is coupled to a processor bus and each of said encryption and authentication processing units comprises a data input ~~path~~ bus coupled to the processor bus.

3. (Amended) A packet processor as recited in claim 1, wherein said data input ~~path~~ bus of the control unit is coupled to a processor bus and each of said encryption and authentication processing units comprises a data input ~~path~~ bus to the processor bus and means for reading and writing data on the processor bus.

4. (Amended) A packet processor as recited in claim 1, wherein said second data ~~path~~ bus comprises a daisy-chain connection between the encryption and authentication processing units.

5. (Amended) A method of processing data packets comprising:

coupling a control unit to a first data ~~path~~ bus;

receiving first and second data packets in the control unit from the first data ~~path~~ bus;

providing a plurality of processing units in data communication with the control unit over a second data ~~path~~ bus, independent of the first data ~~path~~ bus, said processing units including at least one encryption processing unit and at least one authentication processing unit;

providing data of the first data packet from the control unit to one of the processing units, over the second data ~~path~~ bus;

processing said data from the first data packet with said one of the processing units to provide output data for the first data packet from said one of the processing units;

communicating said output data for the first data packet from said one of the processing units to another of the processing units for further processing; and

providing data from the second data packet to said one of the processing units, while said other processing unit further processes the output data for the first data packet.

6.   (Amended) A method as recited in claim 5, wherein said one of the processing units comprises an encryption processing unit and said other of said processing units comprises an authentication processing unit.

7.   (Amended) A method as recited in claim 5, wherein said at least one authentication processing unit comprises a first and second authentication processing units.

9.   (Amended) A method of processing data in a computer, the method comprising the steps of:

performing encryption on a first data packet within an encryption processing unit; and

after completion of the encryption of the first data packet,

performing authentication of the first data packet within at least one authentication processing unit connected to the encryption processing unit by a data bus, and

performing encryption of a second data packet within the encryption processing unit prior to completion of authentication of the first data packet.

15.   (Amended) A method of processing data in a computer, the method comprising the steps of:

encrypting a first data packet with an encryption processing module;

authenticating the encrypted first data packet with a first authentication processing module;

encrypting a second data packet with the encryption processing module while authenticating the first data packet with the first authentication processing module connected to the encryption processing module by a data bus; and

authenticating the second data packet with the first authentication processing module.

16.   (Amended) An apparatus for processing data, comprising:

a computer having a data storage device connected thereto, wherein the data storage device stores a data;

one or more computer programs, performed by the computer, for performing encryption on a first data packet within an encryption processing unit, and, after completion of the encryption of the first data packet, performing authentication of the first data packet in at least one authentication processing unit connected to the encryption processing unit by a data bus, and performing encryption of a second data packet within the encryption processing unit prior to completion of authentication of the first data packet.

22.   (Amended) An apparatus for processing data, comprising:

a computer having a data storage device connected thereto, wherein the data storage device stores a data;

one or more computer programs, performed by the computer, for encrypting a first data packet with an encryption processing module, authenticating the encrypted first data packet with a first authentication processing module connected to the encryption processing module by a data bus, encrypting a second data packet with the encryption processing module while authenticating the first data packet with the first authentication processing module, and authenticating the second data packet with the first authentication processing module.

23.   (Amended) An article of manufacture comprising a computer program carrier readable by a computer and embodying one or more instructions executable by the computer to perform method steps for processing data, the method comprising the steps of:

performing encryption on a first data packet with an encryption processing unit; and

after completion of the encryption of the first data packet,

performing authentication of the first data packet in at least one authentication processing unit connected to the encryption processing unit by a data bus, and

performing encryption of a second data packet within the encryption processing unit prior to completion of authentication of the first data packet.

29.   (Amended) An article of manufacture comprising a computer program carrier readable by a computer and embodying one or more instructions executable by

the computer to perform method steps for processing data, the method comprising the steps of:

encrypting a first data packet with an encryption processing module;

authenticating the encrypted first data packet with a first authentication processing module connected to the encryption processing unit by a data bus;

encrypting a second data packet with the encryption processing module while authenticating the first data packet with the first authentication processing module; and

authenticating the second data packet with the first authentication processing module.

30. (Amended) A method of processing data packets comprising:

coupling a control unit to a first data-path bus;

receiving a first data packet in the control unit from the first data-path bus;

providing a plurality of processing units in data communication with the control unit over a second data-path bus, independent of the first data-path bus, said processing units including at least one encryption processing unit and at least one authentication processing unit;

providing data of the first data packet from the control unit to multiple processing units, over the second data-path bus;

processing said data from the first data packet with said multiple processing units in parallel.

31. (Amended) A method as recited in claim 30, wherein said plurality of processing units comprises at least one encryption processing unit and a plurality of authentication processing units.